

REMARKS

Applicants have carefully considered the February 20, 2007 Office Action, and the amendments above together with the comments that follow are presented in a bona fide effort to address all issues raised in that Action and thereby place this case in condition for allowance. Claims 1-6 and 8 are pending in this application. In response to the Office Action dated February 20, 2007, claim 1 has been amended. Care has been exercised to avoid the introduction of new matter. Adequate descriptive support for the present Amendment should be apparent throughout the originally filed disclosure as, for example, the depicted embodiments and related discussion thereof in the written description of the specification. Applicants submit that the present Amendment does not generate any new matter issue. Entry of the present Amendment is respectfully solicited. It is believed that this response places this case in condition for allowance. Hence, prompt favorable reconsideration of this case is solicited.

Claims 1-6 were rejected under 35 U.S.C. § 103 for obviousness predicated upon Arimondi et al. (U.S. Pat. App. Pub. No. (2005/0072192, hereinafter "Arimondi") in view of Nagayama et al. (U.S. Pat. App. Pub. No. (2002/0059816, hereinafter "Nagayama") and Caplen et al. (U.S. Pat. App. Pub. No. 2003/0089133, hereinafter "Caplen"). Applicants respectfully traverse.

Claim 1 has been amended to describe a method of producing an optical fiber having air holes extending in the axial direction of the fiber. The method includes the step of heating the optical fiber to a temperature in the range of 900°C to 1300°C in an additional heating furnace provided downstream of the drawing furnace, such that Rayleigh scattering of guided light at the interfaces of the air holes is suppressed.

As admitted by the Examiner at page 3 of the Office action, Arimondi does not disclose the presence of oxygen in the holes during the drawing step, as required in claim 1. The Examiner nonetheless referred to Caplen as allegedly teaching this claim feature. Applicants respectfully traverse the rejection in view of the foregoing amendment to claim 1 and the following remarks.

In the drawing step of Caplen, the holes are filled with a dry or drying gas ([0047] and [0048].) The dry or drying gas is exemplified in paragraph [0044]. The gas preferably includes oxygen, if the gas causes etching. That is to say, oxygen is necessary, in Caplen, to suppress etching caused by another component of the gas. Oxygen is not included in Caplen used if the gas does not cause etching.

In the drawing step of the present claimed subject matter, the inner surfaces of holes must be kept smooth in order to suppress an occurrence of Rayleigh scattering. Thus, an etching gas is not used in the drawing step of the present invention. Claim 1 has been amended to clarify the absence of etching by describing that that Rayleigh scattering of guided light at the interfaces of the air holes is suppressed. As stated above, Caplen's method does not use oxygen when an etching gas is not used.

Thus, even if the applied references are combined as suggested by the Examiner, and Applicants do not agree that the requisite realistic motivation has been established, the subject matter of amended claim 1 will not result. *Uniroyal, Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 5 USPQ2d 1434 (Fed. Cir. 1988).

Moreover, the advantage of having oxygen present in the through holes during the drawing step is described in the present specification at page 8, lines 16-21 as follows:

Furthermore, oxygen gas is preferably present in the through holes 23 of the optical fiber preform 20. During drawing, SiO gas is generated in the through holes 23, as described above. However, the generation of the SiO gas can be suppressed because the equilibrium

of Eq. 1 below is shifted to the right side as a result of the presence of the oxygen gas.
$$\text{SiO} + 1/2 \text{O}_2 \rightarrow \text{SiO}_2 \quad \dots (1)$$

Thus, the presence of oxygen in the through holes 23 of the optical fiber preform 20, during drawing, advantageously suppresses SiO gas. The present invention addresses a particular problem attendant upon conventional practices of forming an optical fiber with air holes. That problem, as disclosed in the first full paragraph on page 2 of the written description of the specification, is a decrease in the transmission loss. In order to address that problem Applicants "conducted intensive studies" and found that the transmission loss is due to Rayleigh scattering at the interfaces of the air holes (paragraph bridging pages 4 and 5 of the written description of the specification). Claim 1 has been amended to emphasize the suppression of Rayleigh scattering.

After further studies, Applicants discovered the source of the problem, i.e., that when the microstructured optical fiber is removed from the drawing furnace and cooled, the produced SiO gas adheres to the interfaces of the air holes, and SiO is frozen before becoming stably bonded because the cooling rate of the optical fiber removed from the drawing furnace is 5000°C/second or higher (second full paragraph on page 5 of the written description of the specification). Appellants addressed and solved that problem by providing the method set forth in independent claim 1 which requires, *inter alia*, the use of an additional heating furnace subsequent to drawing, wherein the optical fiber is heated to a temperature range of 900°C to 1300°C.

It is well settled that the recognition of a source of a problem attendant upon conventional practices is, in itself, an indicium of nonobviousness. *In re Spinnoble*, 405 F.2d 578, 160 USPQ 237 (CCPA 1969). Secondly, it is well settled that the problem addressed and solved by a claimed invention must be given consideration as a potent indicium of nonobviousness. Arimondi does not envision the problem addressed and solved by the claimed invention. *North*

American Vaccine, Inc. v. American Cyanamid Co., 7 F.3d 1571, 28 USPQ2d 1333 (Fed. Cir. 1993); *Northern Telecom, Inc. v. Datapoint Corp.*, 908 F.2d 931, 15 USPQ2d 1321 (Fed. Cir. 1990); *In re Newell*, 891 F.2d 899, 13 USPQ2d 1248 (Fed. Cir. 1989); *In re Nomiya*, 509 F.2d 566, 184 USPQ 607 (CCPA 1975).

Based upon the foregoing it should be apparent that a *prima facie* basis to deny patentability to the claimed invention has not been established for lack of the requisite realistic motivation. Moreover, upon giving due consideration to the potent indicia of nonobviousness of record, stemming from Applicants recognition of the source of a problem attendant upon prior art practices, and the failure of the reference to even envision the problem addressed and solved by the claimed invention, the conclusion appears inescapable that one having ordinary skill in the art would not have found the claimed subject matter as a whole obvious within the meaning of 35 U.S.C. § 103. *In re Piasecki*, 745 F.2d 1468, 223 USPQ 785 (Fed. Cir. 1984).

Applicants, therefore, submit that the imposed rejection of claims 1 through 6 under 35 U.S.C. § 103 for obviousness predicated upon Arimondi in view of Nagayama and Caplen is not factually or legally viable and, hence, solicit withdrawal thereof.

Claim 8 was rejected under 35 U.S.C. § 103 for obviousness predicated upon Arimondi in view of Nagayama and Caplen and further in view of Kuwahara et al. (U.S. Pat. App. Pub. No. (2002/0174692, hereinafter “Kuwahara”).

This rejection is traversed. Specifically, claim 8 depends from independent claim 1. Applicants incorporate herein the arguments previously advanced in traversing the imposed rejection of claim 1 under 35 U.S.C. § 103 for obviousness predicated upon Arimondi in view of Nagayama and Caplen. The additional reference to Kuwahara does not cure the previously argued deficiencies in the attempted combination of Arimondi, Nagayama and Caplen.

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Applicants, therefore, submit that the imposed rejection of claim 8 under 35 U.S.C. § 103 for obviousness predicated upon Arimondi in view of Nagayama and Kuwahara is not factually or legally viable and, hence, solicit withdrawal thereof.

Based upon the foregoing it should be apparent that the imposed rejections have been overcome and that all pending claims are in condition for immediate allowance. Favorable consideration is, therefore, solicited. If there are any outstanding issues which might be resolved by an interview or an Examiner's amendment, the Examiner is invited to call Applicants' representative at the telephone number shown below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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